

Math 211  
Quiz 23Y

W 07 Aug 2019

Your name : \_\_\_\_\_

## Exercise

(5 pt) Solve the following nonhomogeneous 2nd-order linear initial value problem:

$$y'' + y' + y = 1, \quad y(0) = 0, \quad y'(0) = 0. \quad (1)$$

*Hint:* Recall that, from the definition of the lapace transform,

$$\mathcal{L}\{y'\}(s) = s\mathcal{L}\{y\} - y(0).$$

Applying this result to  $y''$ , we get

$$\mathcal{L}\{y''\}(s) = s\mathcal{L}\{y'\} - y'(0) = s^2\mathcal{L}\{y\} - sy(0) - y'(0).$$

The following transform–inverse-transform pairs may be useful:

$$\begin{aligned} \mathcal{L}\{1\} &= \frac{1}{s}, & s > 0; & \quad \mathcal{L}\{e^{at}\} = \frac{1}{s-a}, & s > a; \\ \mathcal{L}\{e^{at} \cos(bt)\} &= \frac{s-a}{(s-a)^2 + b^2}, & s > a; \\ \mathcal{L}\{e^{at} \sin(bt)\} &= \frac{b}{(s-a)^2 + b^2}, & s > a. \end{aligned}$$